

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
5 June 2003 (05.06.2003)

PCT

(10) International Publication Number
WO 2003/046672 A3

(51) International Patent Classification⁷: **G05B 19/418**

(21) International Application Number:
PCT/GB2002/005219

(22) International Filing Date:
20 November 2002 (20.11.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0127941.3 21 November 2001 (21.11.2001) GB

(71) Applicant (*for all designated States except US*):
PROPHET CONTROL SYSTEMS LIMITED
[GB/GB]; Manorway House, The Manorway, Stan-
ford-Le-Hope, Essex SS17 9PS (GB).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **READ, Dale**
[GB/GB]; Cimac, Manorway House, The Manorway,
Stanford-Le-Hope, Essex SS17 9PS (GB).

(74) Agent: **HOWDEN, C., A.**; Forrester Ketley & Co., For-
rester House, 52 Bounds Green Road, London N11 2EY
(GB).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,
SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US,
UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report*
- *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

(88) Date of publication of the international search report:
6 May 2004

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: **3D VIRTUAL MANUFACTURING PROCESS**

(57) Abstract: A method of is disclosed of checking the feasibility or other properties of a process involving movement and/or assembly of items or components. The method comprises setting up, within a computer, in terms of corresponding sets of data, a virtual three-dimensional space and, in such space, virtual versions of the items or components concerned, represented by corresponding sets of data, and operating a program in the computer so as to manipulate the virtual items or components in that virtual space. The method makes it possible to determine, by operation of the computer, potential difficulties in manipulating corresponding real items or components in real space. The method can be used to set up, within a computer, a virtual factory in virtual manufacturing premises with dimensions corresponding to the real premises available, with virtual machinery with data as to dimensions, to positioning, movement and timing of such machinery, and virtual personnel with corresponding data as to dimensions, limits of safe movement, speed of movement and the like. It is thus readily possible to adjust the data which is variable, and thus represents degrees of freedom, to arrive at an efficient workable arrangement.

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB 02/05219

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G05B19/418		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 G05B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LATOMBE J-C ET AL: "Assembly sequencing with toleranced parts" COMPUTER AIDED DESIGN, ELSEVIER PUBLISHERS BV., BARKING, GB, vol. 29, no. 2, 1 February 1997 (1997-02-01), pages 159-174, XP004070878 ISSN: 0010-4485 the whole document	1-3,6
X	US 6 157 902 A (SATO YUICHI ET AL) 5 December 2000 (2000-12-05) abstract column 1, line 1 -column 2, line 36 column 32, line 30-35 --- -/--	1-3,6
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents:		
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *Z* document member of the same patent family		
Date of the actual completion of the international search 10 March 2004		Date of mailing of the international search report 18/03/2004
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer MESEGUER MAYORAL, J

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 02/05219

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>HSU W ET AL: "FEEDBACK APPROACH TO DESIGN FOR ASSEMBLY BY EVALUATION OF ASSEMBLY PLAN"</p> <p>COMPUTER AIDED DESIGN, ELSEVIER PUBLISHERS BV., BARKING, GB, vol. 25, no. 7, 1 July 1993 (1993-07-01), pages 395-410, XP000385000 ISSN: 0010-4485 the whole document</p>	1-3,6
X	<p>OLIVER J H ET AL: "AUTOMATED PATH PLANNING FOR INTEGRATED ASSEMBLY DESIGN"</p> <p>COMPUTER AIDED DESIGN, ELSEVIER PUBLISHERS BV., BARKING, GB, vol. 26, no. 9, 1 September 1994 (1994-09-01), pages 658-666, XP000468867 ISSN: 0010-4485 the whole document</p>	1,6
X	<p>EP 1 107 082 A (DASSAULT SYS OF AMERICA) 13 June 2001 (2001-06-13) paragraphs '0006!', '0007!', '0023!'-'0025!</p>	4-6
X	<p>LUNDSTROM M ET AL: "A method for assembly system design including an integrated computerized design support"</p> <p>COMPEURO '93. 'COMPUTERS IN DESIGN, MANUFACTURING, AND PRODUCTION', PROCEEDINGS. PRIS-EVRY, FRANCE 24-27 MAY 1993, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 24 May 1993 (1993-05-24), pages 52-61, XP010096086 ISBN: 0-8186-4030-8 the whole document</p>	6
X	<p>ROSSGODERER U ET AL: "A CONCEPT FOR AUTOMATICAL LAYOUT GENERATION"</p> <p>PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION. NAGOYA, JAPAN, MAY 21 - 27, 1995, NEW YORK, IEEE, US, vol. 1, 21 May 1995 (1995-05-21), pages 800-805, XP000657267 ISBN: 0-7803-1966-4</p>	6
Y	<p>the whole document</p>	4,5

-/-

INTERNATIONAL SEARCH REPORT

Internatl Application No
PCT/GB 02/05219

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ANDRE G ET AL: "Expert systems applied to scheduling of assembly line" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON SYSTEMS, MAN AND CYBERNETICS. LE TOUQUET, OCT. 17 - 20, 1993, NEW YORK, IEEE, US, vol. 3, 17 October 1993 (1993-10-17), pages 743-748, XP010132483 ISBN: 0-7803-0911-1	6
Y	the whole document -----	4,5

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB 02/05219

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6157902	A	05-12-2000	JP 10312208 A DE 19809284 A1	24-11-1998 17-09-1998
EP 1107082	A	13-06-2001	US 6470301 B1 CA 2325005 A1 EP 1107082 A2 JP 2001249961 A	22-10-2002 24-05-2001 13-06-2001 14-09-2001